

Comparison Cortisol Level Before and After Exposed Noise

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Abstract— Noise is a hazard that can not be avoided in the textile company. Some research show that noise can cause health problems, one of them is stress. Several research have shown that cortisol can be used as one of the parameters to help diagnose stress. This research was conducted at PT. Iskandar Indah Textile, Surakarta. The study was designed as an observational study and conducted by cross sectional method. Samples were obtained by using the technique of sampling means that 15 weaving. The variable in this study is cortisol in the blood which was measured by ELISA (enzyme-linked immunosorbent assay). This reaserch shows that the intensity of the noise from the work environment weaving section 94.6 dBA, 97.2 dBA, 97.7 dBA, 98.2 dBA higher than the threshold value (TLV). Based on paired-sample T test analysis showed that the there is difference cortisol level between before and after exposed noise. The conclusion is noise affect of cortisol levels in the blood.

Keywords— Noise, Cortisol Level, Textile.

I. INTRODUCTION

Advances in technology have contributed many positive things in the economic growth and social progress in the world's cultural industry. Technological developments have raised the standard and quality of human life better through increased production and productivity. However, on the other hand technological progress also resulted in adverse impacts in the form of an increase in environmental pollution, the incidence of occupational accidents and occupational diseases^[10].

In order to improve work efficiency, the company needs to consider various issues contained in the working environment. The problems that exist in the workplace is often referred to as workplace hazard. Hazard factor is derived from the chemical, physical, biological, physiological and mental psychology all of which can affect the health of the workers. Noise is one hazard that comes from unwanted physical factors of business or activity within a certain time level and that can cause human health problems and environmental comfort^[9].

In developing countries, noise is classified as a major health problem. Noise is inevitable in the world of work

involving a machine to finish the job. During the production process is still running then the noise will still arise. One way to do is to minimize the emergence of a noise and exposure that will be accepted by the workers.

Noise in the workplace is a major problem in health in many countries. At least 7 million people (35% of the population in America and European industry) exposed to noise at 85 decibels (dB) or more (Soetjipto, 2007). Research conducted in Mexico showed that 38.7% of workers who have a hearing loss due to noise has worked for more than 20 years and by 20% of workers have worked for 11-20 years (Guerra MR, et. Al, 2005).

A variety of health problems that can arise in the work environment is the negative impact of a job. Labor protection covering fairly broad aspects, namely the protection of safety, health, morals maintenance work as well as treatment in accordance with the dignity and morals of the nation. Such protection is intended to provide assurance of safety and improve the health of workers^[11].

Noise is unwanted sound or undesirable to interfere with or endanger health. Impact noise can be categorized into two types, namely auditory and non audiotori. Example Effect audiotori is Deafness temporary (Temporary Threshold Shift / TTS), and Deafness Permanent (Permanent Threshold Shift / PTS), while for the effects of non-auditory is increased blood pressure, increased heart rate, increased metabolism, stress, communication disorders, sleep disorders, disorders execution of tasks, impaired physiology, and disorders unhappy or irritable^[12]. Noise caused some impact on health. In addition to impact the hearing loss intensity high noises can also lead to loss of concentration, loss of balance and disorientation, fatigue, communication disorders, sleep disorders, disorders execution of tasks, impaired physiology, as well as the effect of visceral, such as changes in heart rate or increased pulse rate, changes in blood pressure and rate of transpiration^[13].

Noisy in a high intensity is believed to be one of the causes of stress that may interfere with job performance. Because, noise workplace is something that is not desirable. Allyson Green observed that the noise in the

workplace is a major problem in health in many countries. It is estimated that at least 7 million people (35% of the total population) are exposed to noisy > 85 dBA^[4]. Stressors were first accommodated by the senses and forwarded to the emotional center which is located in the central nervous system. Stress cause different reactions along the hypothalamic pituitary adrenal axis include the increase Adrenocorticotrophic Hormon (ACTH) and corticosteroids^[5].

II. METHOD

This research uses observational study that does not require treatment of the sample studied. Cross sectional design to compare the levels of cortisol in the blood of workers exposed to noise in the production area. Samples were obtained by using the technique of sampling means that 15 weaving and 15 office.

Cortisol in the blood measure by ELISA (enzyme-linked immunosorbent assay) Blood sampling performed before exposed on Saturday and once on Monday at 10:00 am. Noise measurement using by sound level meter. Normal distribution ratio scale data was tested using paired-sample t test for cortisol levels before and after exposed noise.

III. RESULT

Distribution of independent and dependent variables the results of studies conducted on workers at PT. ISKANDAR INDAH TEXTILE Surakarta as follows:

Tabel 1. The frequency distribution of noise and cortisol

Part of job	Noise intensity (dBA)	Frekuensi	Mean cortisol (µg/dL)	
			Before	After
Office	66.20	4	11.96	12.68
	67.40	6		
	71.20	5		
Weaving	94.60	4	10.61	14.25
	97.20	4		
	97.70	4		
	98.20	3		

Data from Table 1 shows that the intensity of the noise that the workers receive a minimum of 66.20 dBA and a maximum of 98.20 dBA. Average workers receive exposure to noise intensity 83.01 dBA.

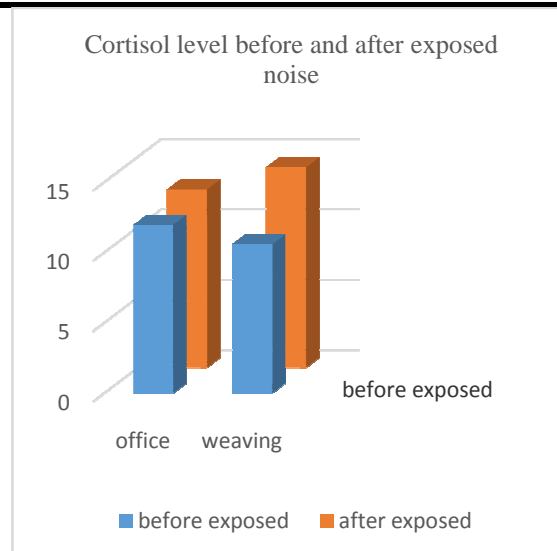


Fig. 1: Cortisol level before and after exposed noise from office and weaving worker

The average exposure levels of cortisol office before 11.96 µg/dL, average cortisol office after exposure to 12.68 µg/dL and the average difference in cortisol office before and after work 0.71 µg/dL. On average cortisol levels before exposure weaving 10.61 µg/dL, average cortisol after exposure weaving 14.25 µg/dL and the average difference in cortisol before and after work weaving 3.64 µg/dL.

The dependent variable comparison test before exposed noise levels of cortisol and cortisol levels after exposed noise on workers Weaving and Office. Because data is the dependent variable and the ratio of normal distribution, the researcher using parametric statistical tests. Comparison test is divided into 3 test of a relationship is Paired-sample T-test and Independent Sample T test. The comparison test determines the significant views from pvalue. If pvalue of <0.05 means that there is a difference between a variable and if pvalue > 0.05 there is a difference between variables.

Tabel 2. Results of comparative tests cortisol levels in the blood before exposure and after exposed noise at Office and weaving

Cortisol in the blood before exposure and after exposure to noise	
	Pvalues
Office	0.354
Weaving	0.021

The statistical test used from table 2 is paired-sample t test for two dependent variable scale ratio data and normal distribution. Based on Table 2 comparison test results dependent variable levels of cortisol before exposed to after exposure at the Office was not significant

(no difference). It can be seen from pvalue more than 0.05. Comparative test results dependent variable levels of cortisol before exposed to after exposed noise a significant portion Weaving (no difference). It can be seen from pvalue less than 0.05.

IV. DISCUSSION

Noise exposure received by workers at PT. ISKANDAR INDAH TEXTILE Surakarta measurement that varies by location. This research was conducted in two working parts, the first part and the second weaving office. Where all the noise intensity at the weaving value is above the threshold value (TLV), while section office all the noisy intensity below the threshold value (TLV).

Measurement of noise intensity on the part of weaving done by 5 points. The first location loom RRC1 intensity noise 94.6 dBA, a second location weaving machines RRC52 intensity 97.2 dBA, the location of the three engines RRC3 intensity 97.7 dBA, the location of a fourth looms Japan and the intensity of 97.7 dBA, and the fifth loom belgium with intensity of 98.2 dBA. The intensity of the noise measurement at the office to do as much as 3 points. The location of the first office first with 67.4 dBA noise intensity, a second location at the office 2 71.2 dBA noise intensity, and a third office 3 with intensity bisng 66.2 dBA.

Diagnosis of stress in the workplace is very difficult. Lots of measuring instruments that have been used. One example using a questionnaire HARS (Hamilton Anxiety Rating Scale). Questionnaire measuring instrument is difficult to diagnose a person experiencing stress or not, because of the honesty of respondents would be devastating to determine the outcome. In contrast to the questionnaire, the diagnosis of stress on a person with a measuring tool of cortisol in the blood results are potentially more accurate than the^[9].

According to Guyton When a person experiences stress, the hypothalamus gland will secrete Corticotropin Releasing Hormone (CRH), which will stimulate pituitary gland secrete adrenocorticotropin hormone (ACTH), which stimulates the adrenal glands secrete cortisol^[6].

Measurement of cortisol performed before exposure and after exposure to a different day and the same hour. The results of comparison test using repeated measures shows that there is a difference of cortisol in the blood before exposure and after exposure to the weaving section and office. It can show of Pvalue less than 0.05 is 0.013. Base on research conducted Allyson Green et al. about the effect of noise exposure on miners in the gold mines in 2015 kejatia measure cortisol levels of worker exposure to noise 65-92 dBA conclude their significant increased levels of cortisol.

Suherwin Rachma has conducted research on a comparison of noise exposure exposed group 92.29 dBA, 71.5 dBA and 52.2 dBA in the airport area Adisumarmo Boyolali. The results obtained from these studies comparison their cortisol level, the greater the intensity of the noise exposure to the higher levels of cortisol. The first group was exposed to 92.29 dBA average noise level of cortisol in the blood of 13.3 µg/dL, group II were exposed to 71.5 dBA average cortisol levels in the blood of 12.2 µg/dL, and Group III average levels of cortisol in blood 10.2 µg/dL^[7].

V. CONCLUSION

There is a difference in cortisol levels in the blood before work and after work on part weaving.

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